



Site 14 Town Creek

Overview: The Town Creek salt marsh is located approximately 4 mi upstream from the mouth of the Merrimack River. There are approximately 350 ac of tidal wetlands upstream of the abandoned railroad embankment owned by MBTA. These wetlands are affected by a severe tidal restriction and predominately consist of large monotypic stands of *Phragmites*. Past studies of the tidal restriction have found the tidal range was reduced by approximately 3.5 ft upstream of the railroad embankment and an additional 1.5 ft upstream of Route 1A. Former salt marsh upstream (or east) of Route 1A is currently dominated by *Phragmites*, *Typha* or other palustrine wetlands. There is a number of low lying commercial properties along Route 1A which abut the marsh. Flow is conveyed via a 4 ft by 4 ft stone box culvert through the railroad embankment and a 36 in pipe under Route 1A. Several smaller culverts under Route 1A do not appear to provide any tidal exchange. There is a wooden flapper gate installed on the downstream end of the stone box culvert. When the railroad line was built in the mid-1800's, there was reportedly an 80-foot long trestle at Town Creek (J. Ray, MBTA pers. comm.). At the request of abutters, the trestle was replaced in 1881 with a wooden box culvert and tide gate with the cost of the work being shared by abutters and the railroad. The resulting tidal dampening provides flood protection to low-lying properties upstream. It is not known when the existing stone culvert was constructed.

Over the past several years, the Wetlands Restoration Program has been working with the Army Corps of Engineers and others to study restoration options for the degraded marsh upstream of this culvert. Modeling completed by the Corps in 2002 shows that viable options exist to significantly increase the upstream tidal range and flushing while maintaining flood protection. During a severe coastal storm in late May of 2005, the railroad embankment at the crossing was overtopped and eroded away, exposing the stone culvert over its entire length. The need for repairs was viewed as a potential opportunity to advance restoration goals.

The current nonstandard assessment consisted of site investigations, review of previous reports and an assessment of the feasibility of increasing tidal exchange within planned immediate repairs or future restoration planning.

Structure conditions: Town Creek passes through the railroad embankment via a 4 ft by 4 ft stone culvert. The culvert is approximately 85 ft in length. The downstream toe of the embankment is armored with a low retaining wall of large cut stone. The downstream end of the culvert is fitted with a heavy wooded flapper gate which is approximately 5 ft square. The gate has been subject to damage and vandalism and has been replaced or repaired several times (D. Levesque, DPW Director, pers. comm.). At the time of inspection, the gate appeared too buoyant and remained in an open position allowing the incoming tide to pass freely through the box culvert. Even in a closed position, the gate appeared to be poorly fitted to the culvert opening allowing significant flows to pass through. More recently, a manhole cover was attached to the gate allowing it to function more effectively as a flapper gate.

During a severe coastal storm in late May of 2005, the embankment was overtopped and eroded away, exposing the stone culvert over its entire length. Prior to washing away, the elevation of the embankment was 9.8 ft (NGVD 29) (ACOE, 2002). The erosion exposed the northern abutment of a previous bridge structure which once existed at this location. The age of the current stone box is unknown. Reportedly, major repairs of the culvert were performed by MBTA in 1994 in response to an Enforcement Action taken by the Conservation Commission and the tide gate was replaced in 2003. Under the current condition, once tides overtop the stone retaining wall, water passes through the 15 to 20 ft wide by 8 ft deep cut in the embankment. The Town has received numerous complaints of flooding since the embankment damage.



Construction Logistics/Feasibility: A meeting was held with town officials, MBTA, CZM representatives and other state and federal stakeholders on September 8, 2005 to develop a course of action to remediate the resulting flooding and erosion problems, as well as to investigate the possibility of incorporating additional tidal exchange now or in the future. The Town's immediate goals are to get the breach in the rail bed repaired to protect against further flooding with the longer-term goal is to restore tidal flows at Town Creek without increasing flooding risks (J. Klima, Selectman, pers. comm.). The Town is in the process of negotiating a long-term lease of the abandoned line as a rail trail. However, the Town felt that MBTA was responsible for repair work. MBTA has taken the position that they are not responsible for the repairs but would assist the Town with some elements of the repair work. Opportunities to reduce the level of tidal restriction without impacted abutting properties (based on the Army Corps modeling efforts) were reviewed. Based on the immediate concerns of legal action and the additional time associated with securing restoration funding, the Town intends to repair the embankment in-kind as a maintenance activity exempt from Section 401 and 404 permit reviews. The work would consist of removing eroded material from the creek, repairing the culvert and headwalls and armoring the embankment slopes.

Measurements of tidal dampening during a single tide event conducted by the Army Corps to support the 2002 hydraulic analysis, documented a restriction of 3.6 ft upstream of the railroad embankment and 0.2 ft upstream of Route 1A. The tide gate was not operational at the time of the measurements. The observed tidal range in the Merrimack River on this date was 9.6 ft. The restriction is presumably greater during a higher spring tide event. Based on survey completed by the Corps, most first floor elevations of properties along Route 1A are higher than 8.0 NGVD. Two properties east of Route 1A have first floor elevations of 5.38 and 5.6 ft NGVD, respectively. These elevations lie below the recorded low point in the roadway of 6.98 ft. The modeling results of an alternative consisting of twin 4 ft by 4 ft box culverts showed no impact to the lowest abutting properties during a 10-year frequency storm event while reducing the tidal restriction during the modeled spring tide by approximately one foot.

These results clearly show the potential exists to substantially reduce current tidal dampening while not causes increased risk of flooding. In fact, properly functioning SRTs offer the potential to improve the flood protection provided by the railroad embankment.

Key steps toward implementation involve the collection of more detailed bathymetry and topography along with a longer tidal record to refine the hydrologic modeling and assess potential flooding potential, collection of pre-restoration baseline data to clearly document the extent of existing ecological impairments and potential benefits. Future planning should also involve effective education and outreach to the Town and affected land owners on environmental and economic benefits. Construction of the rail trail also provides an excellent opportunity for broader environmental education incentives



Railroad
Culvert






-  Potential Restoration Site
-  Photo Locations
-  Tide Gauges
-  Benchmark
-  Ground Elevation



Photo 1 - Downstream View of Crossing



Photo 2 - Wooden Tide Gate





Photo 3 - Upstream View of Crossing



Photo 4 - View of Crossing to North





Photo 5 - View from Route 1 to Northwest



Photo 6 - View from Route 1 to Southeast

